

Ministry of Health of the Republic of Belarus
Education Establishment
"Gomel State Medical University"
Normal Physiology Department

It was discussed at the department meeting 30.08.16
The protocol № 8

METHODICAL INSTRUCTION

for carrying out classes by teachers with the 2nd course students
of Faculty for training specialists for foreign countries (teaching in English)
on normal physiology

Topic: Heart physiology. Electrocardiography

The general time of the class – 4 hours

1. THE STUDYING AND EDUCATIONAL PURPOSES, MOTIVATION FOR ASSIMILATION OF THE SUBJECT, REQUIREMENT TO THE INITIAL LEVEL OF KNOWLEDGE

Purpose of the class

To study a wide spread non-invasive method of research of a functional condition of heart – an electrocardiography.

Motivational characteristic

The electrocardiography is the important method of a research of bioelectric activity of heart consisting in record of changes in time of the potential difference formed by electric field of a myocardium at its excitation. It is a widespread method of non-invasive methods of research of heart functional condition.

As a result of the given class the student has to

To know:

– the general analysis of ECG, its normal indicators, to master the technique of ECG registration.

To be able:

– to make record of an electrocardiogram, to give an assessment of its components and to compare to standards. To draw a conclusion about functional condition of cardiovascular system of the examinee.

2. CONTROL QUESTIONS FROM RELATED SUBJECTS

1. Heart structure. Features of contractile myocardium.
2. The conducting system of heart.
3. Genesis of MP and AP of cardiomyocytes.

3. CONTROL QUESTIONS ON THE CLASS SUBJECT:

1. The role and the place of circulation in an organism. Structurally functional characteristic of cardiovascular system.
2. Heart physiology. Structurally functional characteristic of myocardium.
 - 2.1. Contractile myocardium, structure, physiological properties and features (excitability, conduction, contractility). The factors influencing force of contraction of myocardium. Laws of heart contraction ("everything or nothing", law of F. Starling).

2.2. The conducting system of heart, a structure and functional features. The concept about a pacemaker. The course of distribution of excitation on the conducting system of heart. Automaticity mechanisms. Action potential of pacemaker cells. Automaticity gradient.

2.3. Ratio of excitability, excitation and contraction of myocardium. Action potential of cells of contractile myocardium, its phase and ionic mechanisms, role of calcium ions. Laws of contraction of myocardium. Reaction of cardiac muscle to an additional irritation. The concept about an extrasystole (ventricular, atrial).

2.4. Electric manifestations of cardiac activity. Electrocardiography. Types of leads. Origin of the ECG components. General plan of the analysis and criteria of standard of ECG. Diagnostic value.

Report: The bioelectric phenomena in heart.

4. PRACTICAL PART OF THE CLASS

Laboratory work 19.1. Electrocardiography.

5. THE COURSE OF THE CLASS

- *Introduction:* Students ask the teacher questions which were obtained by certain difficulties in the course of independent mastering of educational material;

- *Requirement to the initial level of knowledge:* from sections of anatomy, histology, biophysics students have to know the morphofunctional characteristic of contractile myocardium, a genesis of RP, AP of cells of contractile myocardium.

- *Assessment of level of knowledge of students:* The student answers control questions on the class term "Heart physiology. Electrocardiography". Questions of features of a structure and functioning of a cardiac muscle, heart automaticity are considered. The teacher specifies the basic concepts and answers of students on the considered subject;

- *Statement of problems which will be solved by students:* The teacher sets a task to master at the level of knowledge technology of ECG record, the general analysis of ECG, criterion and standards of the ECG.

- *Independent performance of tasks by students:* students read reports on the class subject with the subsequent discussion:

- students make out the protocol of laboratory work with the subsequent discussion of a technique of its performance;

- students perform practical work under control of the teacher or laboratory assistant. For work performance students are provided with methodical guidings, an electrocardiograph, disinfectant. Presentation is provided by tables, drawings, slide projector;

- *Assessment of final level of knowledge of the class subject:* The teacher specifies the final level of knowledge of students of theoretical and practical questions, the basic concepts and terms, and also knowledge of basic physiological constants of the class subject;

- *Fixing of knowledge of students:* Students solve situational problems of a subject of the class and answer test questions; viewing of the video "Automaticity of Heart", "Electrocardiography".

- *The conclusion of the teacher and a task to the next class:* At the end of the class the teacher sums up the carried-out work, students receive home task for independent work. Summing up is carried out and protocols of experience are signed.

Note: time of breaks is 15 minutes during a class.

6. QUESTIONS FOR SELF-CHECKING OF KNOWLEDGE

1. At catheterization of a cavity of heart blood pressure was measured (fluctuations from 0 to 25 mm hg) and the amount of oxyhemoglobin in blood (60% of HbO₂) What cavity of heart was cathetered?

2. What of the ECG elements "is most sensitive" to a coronary failure and why?

3. What of waves of QRS complex in norm in various ECG leads, change most by amplitude and why?

4. How will the interval PQ of ECG change at partial and total block of conduct of excitation from auricles to ventricles?

Video " Basics of electrocardiography".

LITERATURE

Basic

1. Human physiology: textbook for overseas students = Физиология человека: учеб. пособие для иностранных студентов, обучающихся на английском языке / А. И. Киеня [и др.]; под ред. проф. Э. С. Питкевича; пер. на англ. яз. Р. А. Карпов, В. А. Мельник. — Гомель: УО ГoГМУ, 2009. — 352 с.
2. Text of lectures.

Alternate

1. Textbook of medical physiology // C. Guyton, 2006. — 1116 p.
2. Human anatomy and physiology // Alexander P., Spence-Elliott B. Masson.
3. Human physiology. The mechanisms of body function // Arthur J. Vander James H Sherman Dorothy S. Luciano, 1986. — 715 p.
4. Lecture notes on human physiology // John J Bray, Patricia A. Cragg, Anthony D.C. Macknight, Roland G. Mills and Douglass W. Taylor.
5. Human anatomy and physiology // Elaine N. Marieb, 1989. — 995 p.
6. Review of medical Physiology, International edition, 2003. — 912 p.